USDA Natural Resources
Conservation Service

Ecological site F095XA002WI
Wet Floodplain

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 095X–Eastern Wisconsin, Northern Illinois, and Upper Michigan Drift Plain

This MLRA is characterized by nearly level to rolling till plains, outwash plains, drumlin fields, and glacial lake plains. It is used to produce cash crops, feed grain, and livestock. It includes the shorelines of Lake Winnebago and Lake Michigan. This area is in Wisconsin (85 percent), Illinois (10 percent), and Michigan (5 percent). It makes up about 17,255 square miles (44,690 square kilometers). This area is in the Central Lowland province of the Interior Plains. Most of the area is in the Eastern Lake section. A narrow strip along the southwestern edge of the area is in the Wisconsin Driftless section. The southwestern quarter is in the Till Plains section. The nearly level to rolling till plains, glacial lake plains, and outwash plains are mixed with drumlin fields, ground moraines, end moraines, flood plains, lake terraces, beaches, dunes, swamps, and marshes. Most of the southern part of this area has belts of morainic hills and ridges and nearly level outwash terraces. Drumlins are prominent features in the central part of the area. Glaciokarst topography occurs in the east-central parts of the area influenced by underlying Niagara Dolomite. Lakes and streams are numerous, and streams generally form a dendritic drainage pattern. Elevation ranges from 530 to 1,580 feet (160 to 480 meters). Local relief is mainly 25 feet (8 meters), but the moraines, drumlins, and bedrock escarpments rise 80 to 330 feet (25 to 100 meters) above the adjacent valleys.

The annual precipitation ranges from 28 to 37 inches (700 to 950 millimeters) with a mean of 33 inches (840 millimeters). The annual temperature ranges from 41 to 48 degrees F (5.1 to 9.2 degrees C) with a mean of 46 degrees F (7.7 degrees C). The freeze-free period ranges from 115 to 185 days with a mean of 155 days. It decreases in length from south to north and from the shore of Lake Michigan inland. Lake Michigan helps to moderate the climate of the area.

This MLRA is mostly covered with glacial drift of Wisconsin age. Some of the higher areas are moraines that appear as arc-shaped ridges representing the retreat of the ice from south to north. Most of the bedrock in the area consists of Silurian, Ordovician, and Cambrian sandstone, limestone, and dolomite. Some igneous and metamorphic rocks underlie the northwestern edge of the area. Devonian limestone and shale occur at the far eastern edge in the Milwaukee area.

The dominant soil orders in this MLRA are Alfisols, Entisols, Histosols, Mollisols, and Spodosols. The soils in the area dominantly have a mesic or frigid temperature regime, an aquic or udic moisture regime, and mixed mineralogy. They are very deep, excessively drained to very poorly drained, and sandy to clayey. Areas of Spodosols and soils with a frigid soil temperature regime occur in the northern part of the MLRA.
The northern part of this MLRA supports natural stands of mixed northern hardwoods and pine. Sugar maple, oak, white ash, elm, yellow birch, white pine, red pine, and American beech are the principal species. Low-lying areas support both mixed hardwoods and conifers. Elm, soft maple, black ash, and northern white cedar are the major species. Brush and sedge meadows also occur in the low-lying areas.

The southern part of this MLRA supports hardwoods and prairie vegetation. Uplands support natural stands of oak, sugar maple, and hickory, and natural prairie vegetation is characterized by little bluestem and big bluestem. Many of the prairies have scattered oak and hickory trees. Low-lying areas support sedge and grass meadows and mixed

stands of hardwoods and conifers. Elm, ash, eastern cottonwood, soft maple, and white cedar are the major species in the low-lying areas. (USDA-NRCS, 2022)

LRU notes

The Northeastern Wisconsin Drift Plain LRU (Land Resource Unit - 95XA) corresponds closely to the Northern and Central Lake Michigan Coastal Ecological Landscapes. Some of the following brief overview is borrowed from the Wisconsin Department of Natural Resources Ecological Landscape publication (2015).

The Northeastern Wisconsin Drift Plain LRU is located along Wisconsin's northeastern and central coast of Lake Michigan and the Door Peninsula. This glacial landscape is comprised of approximately 3.6 million acres (5,715 square miles). It is dominated by till plains and glacial lake deposits. The Green Bay and Lake Michigan Lobes are responsible for the formation of the landscape. The Green Bay Lobe covered most of the LRU, excluding the eastern edge where the Lake Michigan Lobe advanced. The glaciers were separated by the Niagara Escarpment, a 650-mile-long dolomite ridge that begins in Wisconsin near the Illinois border, extends into Michigan's Upper Peninsula and down through Canada's Bruce Peninsula into Rochester, New York. Within LRU 95XA, the escarpment runs from Lake Winnebago northeast through the Door Peninsula. Much of the topography of this LRU is bedrock-controlled. Bedrock is generally deeper than 150cm except in the Door Peninsula, where bedrock is much shallower. Wetlands are common throughout this MLRA where drainage is impeded by fine-textured materials and shallow bedrock.

The northern portion of this LRU is dominated by an undulating till plain, gently sloping to the east, formed entirely by the Green Bay Lobe. This glacial lobe centered over the present-day city of Green Bay and flowed out in a fan shape, moving both south-south west and south-southeast over the Door Peninsula. The lobe deposited loamy and coarse-loamy till mixed with dolomite fragments plucked from the bedrock. In some areas, the till has been reworked by Glacial Lake Oshkosh or overlain by its lacustrine deposits. Numerous drumlins formed, orientated to the south-southwest in the direction of glacial flow. Some eskers are present. Much of this area has dolomite and limestone within 50 ft of the surface. Proglacial streams formed small areas of pitted and unpitted outwash plains, terraces, and fans.

The Door Peninsula was formed primarily by the early advances of the Green Bay Lobe. The till found here is comprised of relatively old, calcareous loamy materials mixed with dolomite and limestone fragments plucked by the glacial lobe from the shallow bedrock. The till is thinly draped over the Niagara Escarpment that lies 1 to 3 meters below the surface. A drumlin field is oriented south-southeast, the direction of the ice flow over the peninsula. The eastern shore of the peninsula is composed of lake sediments that were reworked and deposited by Lake Michigan Lobe. The northern tip of the peninsula has glaciolacustrine beach terrace and ridge deposits and eolian sand dunes, which are remnants of the intra- and postglacial lakes Nipissing and Algonquin.

The central portion of this LRU is dominated by lacustrine deposits from Glacial Lake Oshkosh. In its largest stage, Glacial Lake Oshkosh covered 1.4 million acres. The lake formed from meltwater as the Green Bay Lobe receded between ice sheet advances. The glacial lobe stalled between present day Lake Winnebago and the city of Green Bay, blocking the drainage of meltwater north to the Lake Michigan Basin. Glacial Lake Oshkosh continued to rise until it found other drainage pathways, eventually draining into the Wisconsin River Valley. Glacial Lake Oshkosh reworked the till deposits of the Green Bay Lobe. Silty and clayey lacustrine deposits formed in the deepest area of the lakes, whereas sandy beach ridges, terraces, and dunes formed along the ancient shore.

The area east of Glacial Lake Oshkosh and south along the shore of Lake Michigan are dominated by a thin till sheet over the Niagara Escarpment that was deposited by the Green Bay and Lake Michigan Lobes. The Green Bay Lobe deposited calcareous clay and silty till reworked from lake sediments. The Lake Michigan Lobe deposited silt loam, loam, and compacted sandy clay loam till. Remnants of the intra- and postglacial lakes Nipissing and Algonquin are also found along Lake Michigan shore. Proglacial streams formed small areas of pitted and unpitted outwash plains, terraces, and fans.

Historically, the vegetation in this LRU was dominated by northern and central hardwood forests and wetlands. The northern hardwoods were comprised of eastern hemlock (Tsuga canadensis) and American beech (Fagus grandifolia). The central hardwoods were dominated by sugar maple (Acer saccharum), American basswood (Tilia Americana), and American beech (Fagus grandifolia). Forested wetlands were a major part of the landscape, covering more than 25% in some areas.

Classification relationships

Relationship to Established Framework and Classification Systems:

Habitat Types of N. & S. Wisconsin (Kotar, 2002, 1996): The sites of this ES keyed out to Fraxinus nigra-Ulmus spp./Boehmeria cylindrica [FnUB] and Fraxinus nigra-Acer rubrum/Impatiens spp. [FnArI]

Biophysical Settings (Landfire, 2014): This ES is largely mapped as Laurentian-Acadian Alkaline Conifer-Hardwood Swamp Forest, Central Interior and Appalachian Floodplain Forest, Laurentian-Acadian Floodplain Forest, and Laurentian-Acadian Northern Hardwoods Forest

WDNR Natural Communities (WDNR, 2015): This ES is most similar to the Northern Hardwood Swamp.

Hierarchical Framework Relationships:

Major Land Resource Area (MLRA): 095X–Eastern Wisconsin, Northern Illinois, and Upper Michigan Drift Plain

USFS Subregions: West Green Bay Till Plain (212Tb), Door Peninsula (212Tf), Outagamie Loamy Till and Silty Lake Plain (212Za), Green Bay Clayey and Silty Lake Plain (212Zb), Manitowoc Till Plain (212Zc), Lake Winnebago Clay Plain (222Kc)

DNR Ecological Landscapes: Northern Lake Michigan Coastal, Central Lake Michigan Coastal, Southeast Glacial Plains

Ecological site concept

The Wet Floodplains ecological site occurs throughout LRU 95XA along rivers and streams. These sites are represented by a variety of soil components, most of which are hydric and poorly drained, but some (those formed in alluvium) are in drainage classes up to moderately well drained. These sites consist of various parent materials with the main driving force ecologically being their location within floodplains with seasonal, decadal, and longer periods of flooding. These sites receive water primarily through precipitation, runoff from adjacent uplands, groundwater discharge, and of course flooding. Most of these sites are wetlands. Typical vegetation includes Fraxinus nigra, Acer saccharinum, Quercus bicolor, Cornus racemosa, Ilex verticillate, Carex spp., Onoclea sensibilis, Impatiens capensis, and Laportea canadensis.

These sites differ from the Mucky Swamps by virtue of a different flooding regime due to their adjacency to streams rather than being in depressions. Otherwise they may be similar in vegetation to Mucky Swamps.

Similar sites

F095XA001WI	**Mucky Swamp** Mucky Swamps consist of deep, herbaceous organic materials. They are very poorly drained and remain saturated throughout the year. The occur in landscape depressions and occupy the lowest points on their drainage sequences. Like some Wet Floodplains sites, these sites are wetlands.
F095XA003WI	**Wet Sandy Lowland** These sites consist of very deep, sandy materials, primarily glacial outwash. Some are underlain by finer-textured materials. They are very poorly to poorly drained. Like some Wet Floodplains sites, they vegetation tolerant of prolonged periods of wetness.
F095XA004WI	**Wet Loamy or Clayey Lowland** These sites consist of shallow to very deep, loamy to clayey deposits of various origin. They are sometimes underlain by sandy outwash. They are very poorly to poorly drained. Like some Wet Floodplains sites, they host vegetation tolerant of prolonged periods of wetness.

Table 1. Dominant plant species

Tree	(1) *Fraxinus nigra* (2) *Acer saccharinum*

Shrub	(1) *Ilex verticillata* (2) *Cornus racemosa*
Herbaceous	(1) *Impatiens capensis* (2) *Laportea canadensis*

Physiographic features

This site is found exclusively on floodplains throughout the Northeastern Wisconsin Drift Plain. Sites are in the footslope or toeslope positions and landform shape is concave or linear.

All sites are subject to flooding or ponding at some point throughout the year. Frequent flooding occurs on most sites and may persist up to a month. Ponding is usually brief (2 to 7 days) and is most common in the spring. Most sites have an apparent seasonally high water table (endosaturation) within 6 inches (15 cm) of the surface, but the water table may be much deeper in sites that lack clayey substratum. Occasionally, the water table is perched (episaturation). Runoff is negligible to high.

Table 2. Representative physiographic features

Landforms	(1) Flood plain
Runoff class	Negligible to very high
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	None to frequent
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	None to occasional
Elevation	180–290 m
Slope	0–3%
Ponding depth	0–30 cm
Water table depth	0–152 cm
Aspect	Aspect is not a significant factor

Climatic features

The continental climate of the Northeastern Wisconsin Drift Plain is typical of central Wisconsin – cold winters and warm summers. The climate is moderated by the thermal mass of Lake Michigan, especially in coastal areas. Fall and early winter temperatures are slightly warmer and spring and early summer temperatures are slightly cooler along the Lake Michigan coastline. Lake effect snow occurs along the coastline.

The average annual precipitation for this site is 32 inches. The average annual snowfall is 43 inches. The average annual maximum and minimum temperatures are 54oF and 35oF, respectively.

Table 3. Representative climatic features

Frost-free period (characteristic range)	123-132 days
Freeze-free period (characteristic range)	155-169 days
Precipitation total (characteristic range)	762-787 mm
Frost-free period (actual range)	120-137 days
Freeze-free period (actual range)	154-171 days
Precipitation total (actual range)	762-813 mm
Frost-free period (average)	128 days
Freeze-free period (average)	162 days

Precipitation total (average)	787 mm

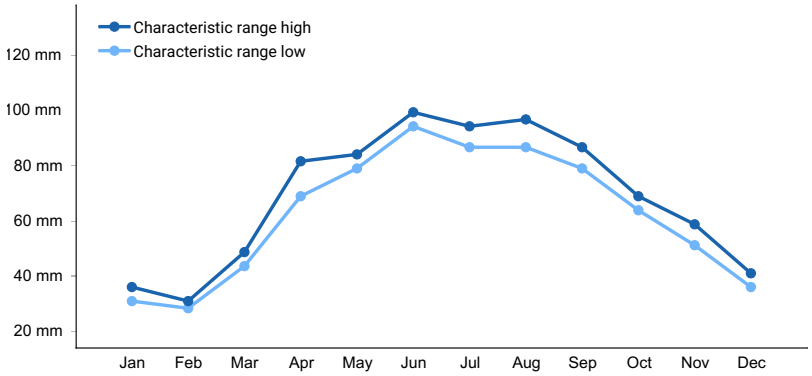


Figure 1. Monthly precipitation range

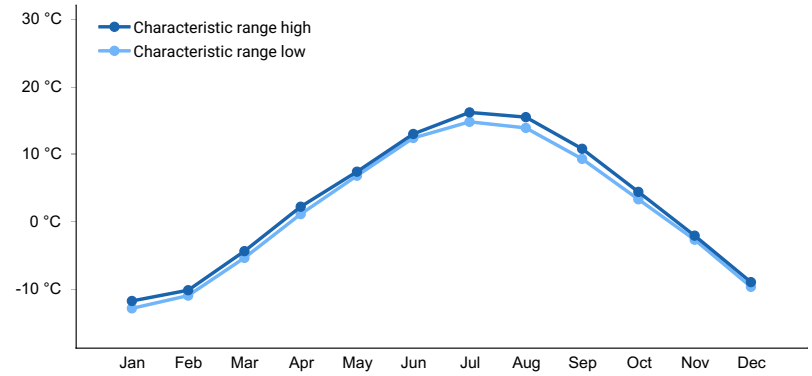


Figure 2. Monthly minimum temperature range

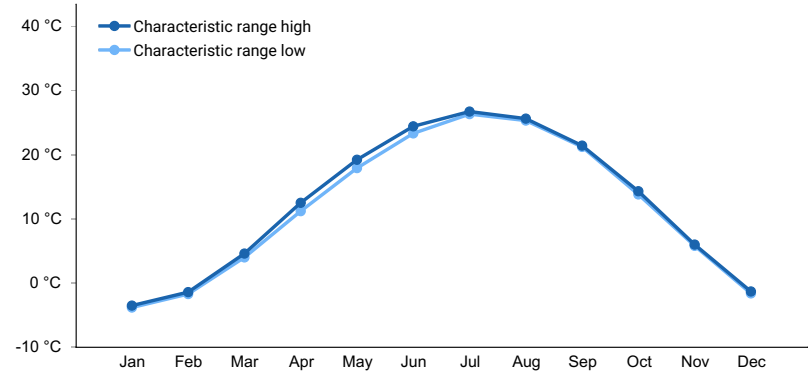


Figure 3. Monthly maximum temperature range

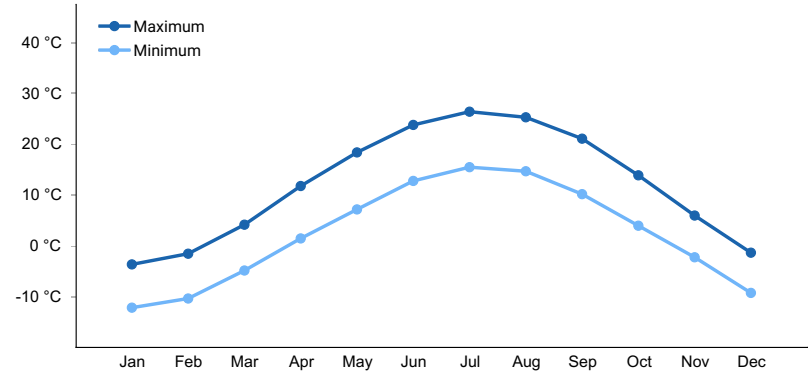


Figure 4. Monthly average minimum and maximum temperature

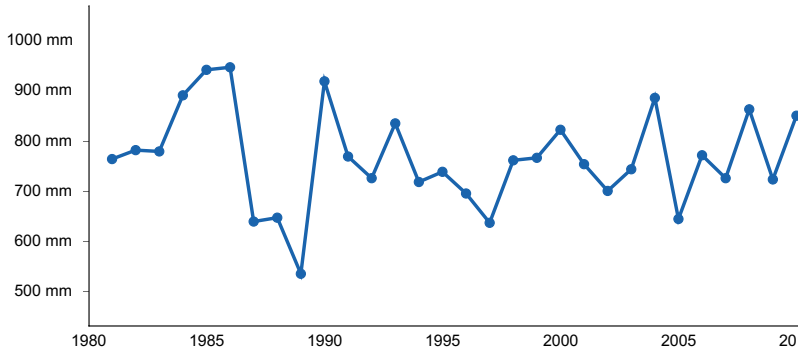


Figure 5. Annual precipitation pattern

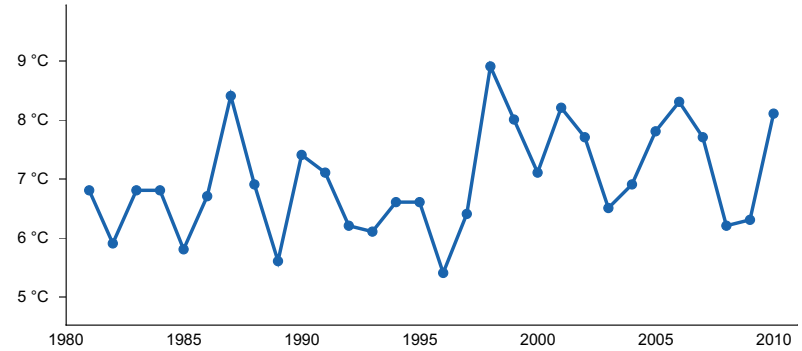


Figure 6. Annual average temperature pattern

Climate stations used

- (1) BRILLION [USC00471064], Brillion, WI
- (2) FOND DU LAC [USC00472839], Fond du Lac, WI
- (3) MANITOWOC [USC00475017], Manitowoc, WI
- (4) GIBBSVILLE [USC00473116], Sheboygan Falls, WI
- (5) DENMARK WWTP [USC00472055], Denmark, WI
- (6) GREEN BAY [USW00014898], Green Bay, WI

Influencing water features

Water is received primarily through precipitation, runoff from adjacent uplands, stream inflow, and groundwater discharge. Water levels are greatly influenced by rates of precipitation and runoff from upland sites. Water leaves the site primarily through stream outflow, subsurface outflow, runoff, evapotranspiration, and groundwater recharge. Some sites may be wetlands.

Flooding from stream inflow is a significant factor in the ecological development of floodplain sites. On most sites, the vegetation must be tolerant of frequent flooding that may persist for a month.

Wetland description

Under the Cowardin System of Wetland Classification, or National Wetlands Inventory (NWI), the wetlands can be classified as:
1) Palustrine, forested, broad-leaved deciduous, saturated, or
2) Palustrine, forested, needle-leaved evergreen, saturated, or
3) Palustrine, scrub-shrub, broad-leaved deciduous, saturated, or
4) Palustrine emergent, persistent, saturated

Under the Hydrogeomorphic Classification System (HGM), the wetlands can be classified as:
1) Depressional, forested/organic, or
2) Depressional, scrub-shrub/organic, or
3) Depressional, herbaceous/organic

Permeability of the soil is impermeable to moderately rapid. The hydrologic group of this site is B/D.

Soil features

The soils of this site are represented by the Arnheim, Bellevue, Depere, Fordum, Pelkie, Poygan, and Radford series. Bellevue is a Fluventic Hapludoll, Radford is a Fluvaquentic Hapludoll, Poygan is a Typic Epiaquoll, Arnheim is a Typic Fluvaquent, Fordum is a Mollic Fluvaquent, Depere is a Typic Udifluvent, and Pelkie is an Oxyaquic Udipsamment. Fluvaquents make up 61% of sites. Hapludolls make up 29% of sites. Udifluvents and Udipsamments each make up 5% of sites.

These soils formed in loamy to clayey alluvium or in silty and clayey lacustrine deposits overlain or underlain by silty and clayey till. Soils are very deep. Most soils are poorly drained and meet hydric soil requirements. Those formed in alluvium are moderately well drained and do not meet hydric soil requirements.

The surface textures of these soils are generally loam, silt loam, or silty clay loam. Those formed along outwash channels in the northern portion of this MLRA have sandy surfaces. Subsurface horizon textures are generally loamy to clayey. Soils are strongly acid to moderately alkaline. Surface fragments are generally absent in these soils. Subsurface fragments smaller than 3 inches in diameter often occupy around 10 percent volume but may occupy up to 22 percent volume. Larger fragments may occupy up to 5 percent volume. Fragments may be stratified (in the case of alluvium and lacustrine deposits) or unstratified (in the case of till). Some of these fragments may be pieces of limestone and dolomite plucked from the bedrock by glacial ice and mixed in with the mineral glacial deposits, and others may be rounded, mixed rocks deposited by flowing water. Secondary carbonates are usually present and may be found as high as 9 inches (23 cm). Most soils with carbonates have a CaCO3 equivalency somewhere around 20 percent.

Figure 7. Fordum Soil Series sampled on 06/28/2020 in Waupaca County, Wisconsin.

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Lacustrine deposits (3) Till
Surface texture	(1) Loamy sand (2) Sandy loam (3) Loam (4) Silt loam (5) Silty clay loam
Drainage class	Poorly drained to moderately well drained
Permeability class	Moderately rapid
Soil depth	201 cm

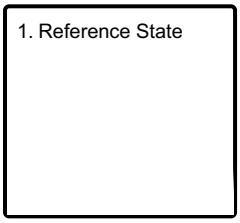
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-150.1cm)	4.19–12.32 cm
Soil reaction (1:1 water) (0-100.1cm)	5.5–7.9
Subsurface fragment volume <=3" (0-100.1cm)	10–22%
Subsurface fragment volume >3" (0-100.1cm)	0–5%

Ecological dynamics

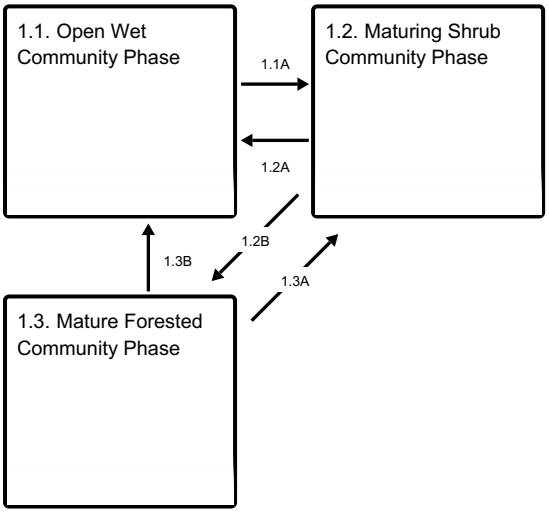
This ES can be characterized as a hydroperiod influenced ecosystem with vegetation ranging from northern wet meadow to northern shrub thicket to Black ash/Silver maple forest. As flooding is less frequent and of shorter duration the site will tend towards Black ash – Silver maple forest. Phases that are flooded more frequently or for longer durations may be dominated by shrubs (Tag and Speckled alder) or sedges if flooding is very prolonged. These sites are very similar to Mucky Swamps, but are more likely to be in phase 1.3 where Mucky Swamps might tend towards 1.1 and 1.2. A further difference is the operability for logging. This ES might allow logging in winter while in Mucky Swamps it is quite unlikely. This difference in operability could be important for restoration after an emerald ash borer infestation.

State and transition model

Ecosystem states



State 1 submodel, plant communities



1.1A - Flooding frequency and duration decreases

1.2A - Flooding frequency and duration increases

1.2B - Very infrequent flooding

1.3B - Flooding frequency and duration increases dramatically

1.3A - Flooding frequency and duration increases moderately

State 1
Reference State

Reference State is a continuum of hydroperiod influenced vegetation where flooding frequency and duration drive vegetation communities. There are three distinct phases, each being stable within a window of hydroperiod variation. Sites on or near floodplains are most likely to be in phases 1.1 and 1.2 while sites farther from streams are more likely to be in phase 1.3. The higher the frequency and more prolonged the wetness the more likely the site will be a northern wet meadow 1.1 (dominantly sedges with sporadic willows and steeplebush). As wetness frequency and duration decreases the site will become a northern shrub thicket 1.2 and speckled alder (and tag alder) will appear and begin to dominate the vegetation. If a site has very low frequency flooding/ponding that is of short duration a Black ash/Silver maple forest will likely form 1.3. This forested state can be described by the Kotar Wetland Forest Habitat Types Black ash-Red Elm/False nettle [FnUB] and Black ash-Red maple/Spotted Touch-me-not [FnArI]. In some cases this forest will also include White cedar as an associate, but deer browsing has limited the regeneration of this species.

Community 1.1
Open Wet Community Phase

With frequent flooding and long durations of inundation this ES will exhibit as a northern wet meadow. The vegetation will be dominated by sedges and grasses with sporadic willows and steeplebush present. Willows can be quite extensive in these sites at times. As long as the hydroperiod is consistent this is a stable state. This phase may also include some isolated large shrubs or trees that persist from a previous phase with a different hydroperiod.

Dominant plant species

- willow (*Salix*), tree
- steeplebush (*Spiraea tomentosa*), shrub
- sedge (*Carex*), grass

Community 1.2
Maturing Shrub Community Phase

With moderate frequency of flooding with out very long durations of inundation a shrub thicket will form on these sites. The composition of the shrubs on these sites is often dominated by Tag and/or Speckled alder but willow may occur as well. As long as the hydroperiod is consistent this is a stable state.

Dominant plant species

- gray alder (*Alnus incana*), shrub
- speckled alder (*Alnus incana ssp. rugosa*), shrub

Community 1.3
Mature Forested Community Phase

Figure 8. Image courtesy of UWSP taken on 06/28/2020 in Waupaca County, Wisconsin.

In the absence of frequent long duration flooding a wet forest community composed of Black ash and Balsam fir will dominate these sites. Common associates may include Red maple, American elm, and White cedar. White cedar is more common on these sites than on the similar phase in “Mucky Swamps”. Reproduction of Black ash is often very successful in these stands. A shrub layer may be present in this community phase as well. The shrub layer is often composed of Gray dogwood and Winterberry. Understory plant communities may be composed of many different species including sedges, grasses, and ferns. Jewelweed and Woodnettle are very common understory species.

Dominant plant species

- black ash (*Fraxinus nigra*), tree
- balsam fir (*Abies balsamea*), tree
- gray dogwood (*Cornus racemosa*), shrub
- common winterberry (*Ilex verticillata*), shrub
- jewelweed (*Impatiens capensis*), other herbaceous
- Canadian woodnettle (*Laportea canadensis*), other herbaceous

Pathway 1.1A
Community 1.1 to 1.2

This transition represents a decrease in hydroperiod where flooding frequency and duration decrease enough for Tag alder and Speckled alder to establish in what was previously open sedges with Steeplebush, and a few isolated Willows.

Pathway 1.2A
Community 1.2 to 1.1

This transition represents an increase in the hydroperiod where flooding frequency and duration increase enough for Sedges to out compete Tag alder and Speckled alder. This could be done as a restoration effort if hydroperiod is controllable or the stream channel is made narrower causing increased frequency of flooding.

Pathway 1.2B
Community 1.2 to 1.3

This transition represents a decrease in hydroperiod where flooding frequency and duration decrease enough for Black ash and Silver maple to establish and out compete Tag alder and Speckled alder. This ecosystem is stable with very infrequent and/or short duration flooding. Understory species will shift to Jewelweed, sedges, and Woodnettle. Sites where there is little deer browse may include White cedar as an associate.

Pathway 1.3B
Community 1.3 to 1.1

This transition represents a dramatic increase in the hydroperiod where flooding frequency and duration increase enough for Sedges to out compete Black ash and Silver maple. This could be done as a restoration effort if hydroperiod is controllable or the stream channel is made narrower causing increased frequency of flooding.

Pathway 1.3A
Community 1.3 to 1.2

This transition represents an increase in the hydroperiod where flooding frequency and duration increase enough for Tag alder and Speckled alder to outcompete Black ash and Silver maple.

Additional community tables

Inventory data references

Plot and other supporting inventory data for site identification and community phases is located on a NRCS North Central Region shared and one drive folder. University Wisconsin-Stevens Point described soils, took photographs, and inventoried vegetation data at community phases within the reference state. The data sources include WI ESD Plot Data Collection Form - Tier 2, Releve Method, NASIS pedon description, NRCS SOI 036, photographs, and Kotar Habitat Types.

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Approval

Suzanne Mayne-Kinney, 11/16/2023

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NRCS contracted UWSP to write ecological sites in MLRA 95X. Completed in 2021.

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	11/23/2024
Approved by	Suzanne Mayne-Kinney
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

17. **Perennial plant reproductive capability:**